IN THE CLAIMS

1. (Currently Amended) A noise shaping arrangement for a phase locked loop, the arrangement comprising:
a first order sigma-delta modulator ~~(500)~~ arranged to provide a first-order quantized output and a feedback path output ~~(508)~~;
a second order sigma-delta modulator ~~(520)~~ coupled to receive the feedback path output ~~(508)~~ from the first order sigma-delta modulator ~~(500)~~ and arranged to provide a second order quantized output; and
combination means ~~(530)~~ arranged to combine the first and second order quantized outputs to provide a combined third order quantized output ~~(540)~~,
wherein the combined third order output provides noise shaping with a frequency notch spectrum.

2. (Currently Amended) The arrangement of claim 1 wherein the second order sigma-delta modulator is arranged with one or more complex conjugate pairs of zeros ~~(270, 275)~~.

3. (Currently Amended) The arrangement of claim 2 wherein the one or more complex conjugate pairs of zeroes ~~(270, 275)~~ is located on the unity circle.

4. (Currently Amended) The arrangement of claim 2 ~~or 3~~ wherein the one or more complex conjugate pairs of zeroes ~~(270, 275)~~ is located away from the real axis.

5. (Original) The arrangement of claim 4 wherein the frequency location of the one or more complex pair of zeros is a selected one of substantially 365kHz and substantially 518kHz.

5. (Canceled) ~~The arrangement of any preceding claim where the feedback path output of the first order sigma-delta modulator received by the second order sigma-delta modulator is scaled (521) by a factor of substantially one quarter and wherein accumulators of the first order (504) and second order (522) sigma-delta modulator respectively have the same bit-size.~~

6. (Currently Amended) The arrangement of ~~any preceding~~ claim 1, further comprising a delay block ~~(506)~~ coupled between the feedback output of the first order sigma-delta modulator and the combination means.

7. (Currently Amended) The arrangement of ~~any preceding~~ claim 1 wherein the combination means ~~(530)~~ includes scaling means ~~(532, 534)~~ coupled to scale the second order quantized output of the second order sigma-delta modulator by a predetermined scaling factor.

8. (Original) The arrangement of claim 7 wherein the predetermined scaling factor is substantially 2^{-22}.

9. (Currently Amended) The arrangement of any preceding claim wherein the second order sigma-delta modulator ~~(520)~~ is operable to cancel the quantisation noise of the first order sigma-delta modulator ~~(500)~~.

10. (Currently Amended) The arrangement of ~~any preceding~~ claim 1 wherein the feedback path output comprises a quantisation noise of the first order sigma-delta modulator ~~(500)~~.

11. (Currently Amended) The arrangement of ~~any preceding~~ claim 1 wherein the frequency notch spectrum comprises at least one non-DC frequency notch.

12. (Currently Amended) The arrangement of ~~any preceding~~ claim 1 wherein the second order sigma-delta modulator ~~(520)~~ comprises a loop arrangement having a

forward processing block ~~(420)~~ implementing the transfer function given by the z-transform:

$$\frac{z^{-1}}{1-2z^{-1}\cos\theta+z^{-2}}$$

and a feedback processing block ~~(450)~~ implementing the function given by the z-transform:

$$2\cos\theta - z^{-1}$$

where

$$\theta = 2\pi\frac{f}{f_s}$$

and f is the desired notch frequency and f_s is the sample frequency.

13. (Currently Amended) A phase locked loop incorporating the noise shaping arrangement of ~~any preceding~~ claim 1.

14. (Currently Amended) A method for noise shaping in a phase-locked loop, the method comprising the steps of:
providing a first order quantized output from a first order sigma-delta modulator ~~(500)~~;
providing a second order quantized output from a second order sigma-delta modulator ~~(520)~~ coupled to receive a feedback path output ~~(508)~~ from the first sigma-delta modulator ~~(500)~~;
combining ~~(530)~~ the first and the second order quantized outputs to provide a combined third order quantized output ~~(540)~~,
wherein the combined third order output provides noise shaping with a frequency notch spectrum.

15. (Currently Amended) The ~~arrangement, phase locked loop or~~ method of ~~any preceding~~ claim 14 wherein the phase locked loop is a fractional-n phase locked loop frequency synthesizer.

16. (New) The arrangement of claim 1 where the feedback path output of the first order sigma-delta modulator received by the second order sigma-delta modulator is scaled by a factor of substantially one quarter and wherein accumulators of the first order and second order sigma-delta modulator respectively have the same bit-size.